INVESTIGATING THE EFFECTS OF ATTRIBUTE FREQUENCY AND TYPE IN TCATA TESTING

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INTRODUCTION

Building on earlier methods (TQT, CATA, TDS), the TCATA method was introduced to continuously track sensory attributes responsible for the dynamic nature of foods. This method requires assessors to select all sensory attributes that they consider applicable at each moment of the evaluation, and to de-select them when no longer perceived. Although promising, some methodological limitations have been reported and further research was recommended; Specifically, the variance in panelist thresholds for selecting vs. unselecting attributes needed further investigation. Consequently, TCATA Fading was introduced. The ideal number of attributes in the TCATA ballot was also explored due to a concern that assessors were not able to pay attention to all terms when a larger number was considered. However, Jaeger (et al., 2018) stated that increasing the attributes to 15 was not detrimental for product discrimination and both TCATA and TCATA-Fading provided good data quality. The current research further investigated the number of attributes for TCATA. Starting with a short list of four attributes of 3 basic taste mixtures in an apple juice base, the authors then compared the TCATA results for the same apple juice solutions but with additional textural terms for a total of 9 attributes. The TCATA evaluations were completed by a semi-trained panel. This research will further contribute to establishing guidelines for best practice of TCATA methods.

OBJECTIVES:

To investigate the number of attributes to use in the TCATA method

Phase 1: to establish a baseline minimum number of TCATA attributes that produce quality data

Phase 2: to investigate the impact of the increased number of attributes (from 4 to 9), on the TCATA data quality.

MATERIALS AND METHODS

Phase 1: The following 4 solutions of apple juice were presented to n=30 respondents: the base solution (plain apple juice, low acid version), and 3 trial solutions which represented mixtures of the base solution with different concentrations of: sugar (sweet), citric acid (sour), and sodium chloride (salty). The concentrations of the 3 basic tastes were determined in such a way that each solution elicited an expected dominant basic flavour/taste i.e. apple (base solution), sweet, salt, sour, corresponding to the four TCATA attributes.

Phase 2: In Phase 2, additional ingredients (heat/chili and chia seeds) were added in equal amounts to 3 trial solutions, resulting in total of 9 attributes: heat, slippery, seedy, chewy, and bland plus the 4 original attributes (Apple, Sweet, Sour, Salty).

Panel protocol: The solutions were presented to the panelists according to an experimental design to balance biases associated with sample position and first-order carryover. The attributes were randomized between the panellists; however, each panelist received a fixed attribute list. The panelists were asked to take a full sip of the apple juice solution in the mouth and immediately after that start selecting the attributes that they were experiencing, and deselecting the attributes when they no longer experienced them.

TCATA data (original version) were collected using computerized data collection software (ACCE-IT). To explore changes of an attribute over time, the TCATA curves were plotted so that each curve represented one attribute for the 4 solutions tested.

RESULTS AND DISCUSSION:

Figure 1 shows specific attribute curves plotted for each solution in phase 1(a) and phase 2(b). Based on the phase 1 results, the attribute (apple, salt, sour, sweet) designed to be the dominant in the solution showed the highest curve/peak and it was significantly higher than the average curve. For example, the base solution exhibited the strongest apple flavour and the 'apple' curve was higher than the 'apple' curves of the trial solutions. Thus, for a low number of attributes and relatively simple solutions, the panelists were able to produce results that matched the dominant and expected taste/flavour in the apple juice solutions.

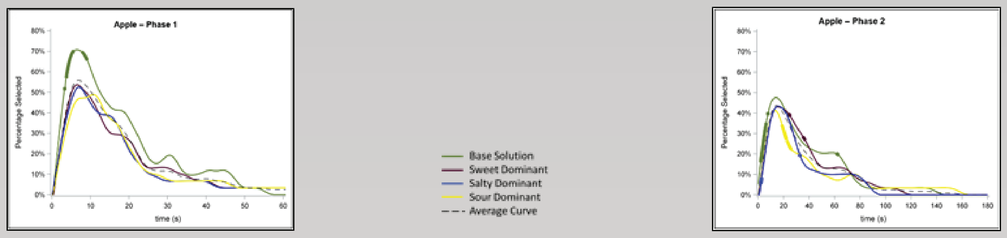

Fig. 1a Fig. 1b

Fig. 1. Apple attribute for the four solutions: Fig. 1a for Phase 1 and Fig. 1b for Phase 2

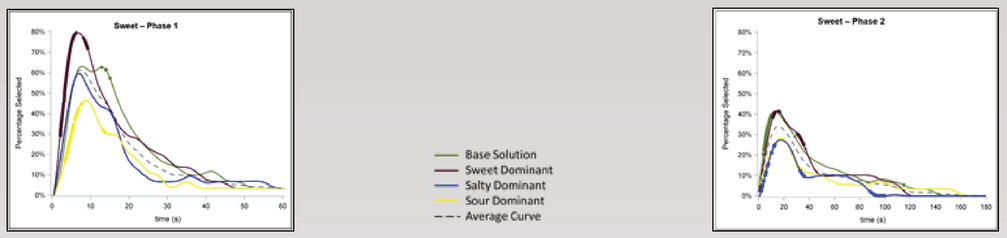

Fig. 2a Fig. 2b

Fig. 2. Sweet attribute for the four solutions: Fig. 2a for Phase 1 and Fig. 2b for Phase 2

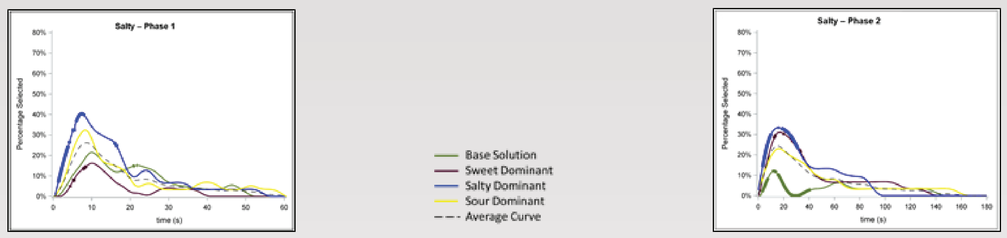

Fig. 3a Fig. 3b

Fig. 3. Salt attribute for the four solutions: Fig. 3a for Phase 1 and Fig. 3b for Phase 2

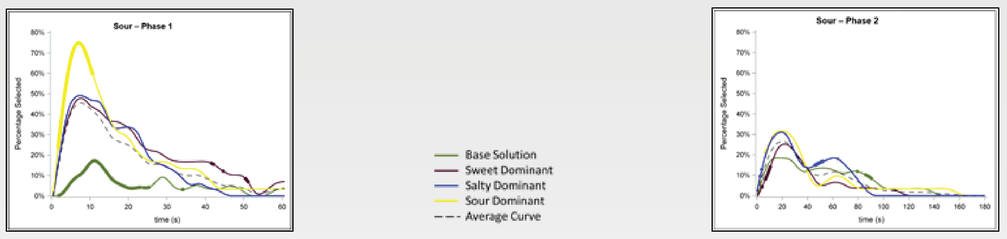

Fig.4a Fig. 4b

Fig. 4. Sour attribute for the four solutions: Fig. 4a for Phase 1 and Fig. 4b for Phase 2

When looking at Phase 2 results and focusing only on the original 4 attributes (Apple, Sweet, Sour, Salty), the dominant attribute curves, in most cases, were no longer higher or significantly different. In addition, the percentage selected for each attribute had decreased when compared to phase one. Moreover, the length of time for all attributes to be deselected was much longer (going from 1 minute to 1.5 minutes)

For the additional attributes, heat appeared to take the longest time for being deselected reflecting potential lingering of this attribute. The texture curves did not appear to show any significant differences between solutions. The bland attribute, used as a potential distraction attribute, was the lowest attribute selected, and showed similar pattern in all four solutions.

Literature: Jaeger, S., Alcaire, F., Hunter, D., Jin, D., Castura, J., Ares G. (2018). Number of terms to use in temporal check-all-that-apply studies for sensory product characterization by consumers. FQP 64,154–159